

**Clean Copy of Allowed Claims**

1. A computer implemented method of organizing a graphical model of an engineered system, comprising:
  - identifying a component of the graphical model based on selected characteristics or a pattern of similarities for conversion into a reference;
  - processing the component to identify the pattern of similarities with other components or similarities of selected characteristics, and automatically converting the component into a reference;
  - wherein converting the component into a reference comprises replacing a similar pattern or a set of selected characteristics of a representation of the component by a reference to a previous occurrence of that similar pattern or set of selected characteristics in a representation of any component; and
  - storing the reference and contents of the representation of the component in a file in the computer for coordinating a graphical modeling process.
2. The method of claim 1, wherein the component comprises at least one of a system, a sub-system, a portion of a system, and a portion of a sub-system disposed within the graphical model.
3. The method of claim 1, wherein the graphical model comprises a plurality of components.

4. The method of claim 1, wherein identifying the component comprises heuristically locating a re-usable pattern and selecting the component to represent the re-usable pattern.
5. The method of claim 1, wherein identifying the component comprises utilizing a checksum to identify a selected pattern and selecting the component that matches the selected pattern.
6. The method of claim 1, wherein identifying the component comprises heuristically locating a specific type of component and selecting the component that matches the specific type.
7. The method of claim 1, wherein identifying the component comprises locating a selected acyclic graph of blocks and selecting the component that contains the selected acyclic graph of blocks.
8. The method of claim 1, wherein identifying the component comprises utilizing a partitioning specific checksum to select a predetermined combination of selected patterns and selected re-usable features of the component for identification.
9. The method of claim 1, wherein identifying the component comprises soliciting user interaction to participate in a selection of the component based on at least one of pattern matching, re-usability, and polymorphism characteristics.

10. The method of claim 1, wherein automatically converting the component into a reference further comprises:

creating a new model;

copying into the new model a portion of the contents of a representation of the component that relates to a repeated pattern or a repeated functionality; and

copying into the new model a configuration set associated with the component.

11. The method of claim 10, further comprising setting attributes of input and output ports of the component.

12. The method of claim 10, wherein automatically converting the component into a reference further comprises replacing the contents of the representation of the component that were copied into the new model and the configuration set with a reference to the new model, where the replacing forms a model reference.

13. The method of claim 12, wherein the configuration set comprises model peripheral information comprising at least one of numerical solver, start and stop times, code generation target and logging options.

14. The method of claim 10, further comprising replacing the contents of representations of other components having a pattern of similarities with the new model with references to the new model, where the replacing forms model references.

15. The method of claim 1, wherein automatically converting the component into a reference comprises converting the pattern into a new subsystem within the graphical model.

16. The method of claim 15, wherein automatically converting the component into a reference further comprises copying the contents of representation of the subsystem into a library, forming a library subsystem and leaving an original representation of the subsystem within the graphical model.

17. The method of claim 16, wherein automatically converting the component into a reference further comprises replacing the original representation of the subsystem with a reference to the library subsystem, where the replacing forms a library reference.

18. The method of claim 17, further comprising replacing the contents of representations of the other components having a pattern of similarities with the library subsystem with references to the library subsystem.

19. The method of claim 1, wherein the reference comprises at least one of a library reference and a model reference.

20. A system for organizing a graphical model of an engineered system, the system comprising:

a computer comprising a processor, a memory and a display device;

an identifier for identifying a component of the graphical model based on selected characteristics or a pattern of similarities for conversion into a reference;

a converter for processing the component to identify the pattern of similarities with other components or similarities of selected characteristics, and automatically converting the component into a reference;

wherein converting the component into a reference comprises replacing a similar pattern or a set of selected characteristics of a representation of the component by a reference to a previous occurrence of that similar pattern or set of selected characteristics in a representation of any component; and

a storage facility for storing the reference and contents of the representation of the component in a file in the computer for coordinating a graphical modeling process.

21. The system of claim 20, wherein the component comprises at least one of a system, a sub-system, a portion of a system, and a portion of a sub-system disposed within the graphical model.

22. The system of claim 20, wherein the graphical model comprises a plurality of components.

23. The system of claim 20, wherein identifying the component comprises heuristically locating a re-usable pattern and selecting the component to represent the re-usable pattern.

24. The system of claim 20, wherein the identifier utilizes a checksum to identify a selected pattern and selecting the component that matches the selected pattern.

25. The system of claim 20, wherein the identifier heuristically locates a specific type of component and selects the component that matches the specific type.

26. The system of claim 20, wherein the identifier locates a selected acyclic graph of blocks and selects the component that contains the selected acyclic graph of blocks.

27. The system of claim 20, wherein the identifier utilizes a partitioning specific checksum to select a predetermined combination of selected patterns and selected reusable features of components for identification.

28. The system of claim 20, wherein the identifier solicits user interaction to participate in a selection of the component based on at least one of pattern matching, re-usability, and polymorphism characteristics.

29. The system of claim 20, wherein the converter  
creates a new model;  
copies into the new model a portion of the contents of a representation of the component that relates to a repeated pattern or a repeated functionality; and  
copies into the new model a configuration set associated with the component.

30. The system of claim 29, the converter sets attributes of input and output ports of the component.

31. The system of claim 29, the converter replaces the contents of the representation of the component that were copied into the new model and the configuration set with a reference to the new model, where the replacing forms a model reference.

32. The system of claim 31, wherein the configuration set comprises model peripheral information comprising at least one of numerical solver, start and stop times, code generation target and logging options.

33. The system of claim 29, wherein the converter replaces the contents of representations of other components having a pattern of similarities with the new model with references to the new model, where the replacing forms model references.

34. The system of claim 20, wherein the converter converts the pattern into a new subsystem within the graphical model.

35. The system of claim 34, wherein the converter copies the contents of representation of the subsystem into a library, forming a library subsystem and leaving an original representation of the subsystem within the graphical model.

36. The system of claim 35, wherein the converter replaces the original representation of the subsystem with a reference to the library subsystem, where the replacing forms a library reference.

37. The system of claim 36, wherein the converter replaces the contents of representations of the other components having a pattern of similarities with the library subsystem with references to the library subsystem.

38. The system of claim 20, wherein the reference comprises at least one of a library reference and a model reference.

39. A computer readable storage medium holding computer executable instructions which when executed on a computer perform a method of organizing a graphical model of an engineered system, the medium comprising:

instructions for identifying a component of the graphical model based on selected characteristics or a pattern of similarities for conversion into a reference;

instructions for processing the component to identify the pattern of similarities with other components or similarities of selected characteristics, and automatically converting the component into a reference;

wherein converting the component into a reference comprises replacing a similar pattern or a set of selected characteristics of a representation of the component by a reference to a previous occurrence of that similar pattern or set of selected characteristics in a representation of any component; and



instructions for storing the reference and contents of the representation of the component in a file in the computer for coordinating a graphical modeling process.

40. The medium of claim 39, wherein the component comprises at least one of a system, a sub-system, a portion of a system, and a portion of a sub-system disposed within the graphical model.

41. The medium of claim 39, wherein the graphical model comprises a plurality of components.

42. The medium of claim 39, wherein instructions for identifying the component comprises instructions for heuristically locating a re-usable pattern and selecting the component to represent the reusable pattern.

43. The medium of claim 39, wherein instructions for identifying the component comprises instructions for utilizing a checksum to identify a selected pattern and selecting the component that matches the selected pattern.

44. The medium of claim 39, wherein instructions for identifying the component comprises instructions for heuristically locating a specific type of component and selecting the component that matches the specific type.

45. The medium of claim 39, wherein instructions for identifying the component comprises instructions for locating a selected acyclic graph of blocks and selecting the component that contains the selected acyclic graph of blocks.

46. The medium of claim 39, wherein instructions for identifying the component comprises instructions for utilizing a partitioning specific checksum to select a predetermined combination of selected patterns and selected re-usable features of components for identification.

47. The medium of claim 39, wherein instructions for identifying the component comprises instructions for soliciting user interaction to participate in a selection of the component based on at least one of pattern matching, re-usability, and polymorphism characteristics.

48. The medium of claim 39, wherein instructions for automatically converting the component into a reference further comprises:

instructions for creating a new model;

instructions for copying into the new model a portion of the contents of a representation of the component that relates to a repeated pattern or a repeated functionality;  
and

instructions for copying into the new model a configuration set associated with the component.

49. The medium of claim 48, further comprising instructions for setting attributes of input and output ports of the component.

50. The medium of claim 48, wherein instructions for automatically converting the component into a reference further comprises instructions for replacing the contents of the representation of the component that were copied into the new model and the configuration set with a reference to the new model, where the replacing forms a model reference.

51. The medium of claim 50, wherein the configuration set comprises model peripheral information comprising at least one of numerical solver, start and stop times, code generation target and logging options..

52. The medium of claim 48, further comprising instructions for replacing the contents of representations of other components having a pattern of similarities with the new model with references to the new model, where the replacing forms model references.

53. The medium of claim 39, wherein instructions for automatically converting the component into a reference comprises instructions for converting the pattern into a new subsystem within the graphical model.

54. The medium of claim 53, wherein instructions for automatically converting the component into a reference further comprises instructions for copying the contents of

representation of the subsystem into a library, forming a library subsystem and leaving an original representation of the subsystem within the graphical model.

55. The medium of claim 54, wherein instructions for automatically converting the component into a reference further comprises instructions for replacing the original representation of the subsystem with a reference to the library subsystem, where the replacing forms a library reference.

56. The medium of claim 55, further comprising instructions for replacing the contents of representations of the other components having a pattern of similarities with the library subsystem with references to the library subsystem.

57. The medium of claim 39, wherein the reference comprises at least one of a library reference and a model reference.

58. A computer implemented method of simplifying a graphical model of an engineered system, comprising:

identifying repeating occurrences of a pattern of similarities among a plurality of components;

creating a new model based on the pattern of similarities;

copying into the new model a portion of the contents of a representation of a component that relates to a repeated pattern or a repeated functionality and

copying into the new model a configuration set associated with the component;

replacing each of the repeating occurrences of the pattern of similarities in components with a reference to the new model; and

storing the references and the contents of representations of the components in a file in the computer for coordinating a graphical modeling process.

59. The method of claim 58, wherein each of the components comprises at least one of a system, a sub-system, a portion of a system, and a portion of a sub-system disposed within the graphical model.

60. The method of claim 58, wherein identifying repeating occurrences of the pattern comprises heuristically locating a re-usable pattern amongst the plurality of components and selecting one of the components to represent the re-usable pattern.

61. The method of claim 58, wherein identifying the repeating occurrences of the pattern comprises utilizing a checksum to identify selected patterns amongst the plurality of components and selecting an individual of the components that matches the selected patterns.

62. The method of claim 58, wherein identifying the repeating occurrences of the pattern comprises heuristically locating a specific type of component amongst the plurality of components and selecting one of the components that matches the specific type.

63. The method of claim 58, wherein identifying the repeating occurrences of the pattern comprises locating a selected acyclic graph of blocks amongst the plurality of

components and selecting one of the components that contains the selected acyclic graph of blocks.

64. The method of claim 58, wherein identifying the repeating occurrences of the pattern comprises utilizing a partitioning specific checksum to select a predetermined combination of selected patterns and selected re-usable features of components amongst the plurality of components for identification.

65. The method of claim 58, wherein identifying the repeating occurrences of the pattern comprises soliciting user interaction to participate in a selection of the component based on at least one of pattern matching, re-usability, and polymorphism characteristics.

66. Canceled.